

position of being the only nation having two representatives on the committee. The circumstances leading to this are detailed in the "Procès-verbaux." The two members are Major MacMahon, F.R.S., and Sir David Gill, K.C.B., F.R.S.

One of the most important pieces of work recently completed at the bureau is the new study of the relation between the metre and the wave-length of the red cadmium line. The classic research of Messrs. Michelson and Benoit fifteen years ago laid the foundation of a whole system of independent controls on the invariability of the prototype. Although the maximum divergence of the three independent determinations made was only one micron (0.001 mm.), and the probable error of the mean considerably less, yet it was felt desirable to repeat the work with the highest possible refinements. This has been done by Messrs. Benoit, Perot, and Fabry, employing a totally different type of interference fringes from those used in the earlier work. By this change and by the use of "invar," the laborious "build-up" process of the older method has been greatly shortened, and the precision of the measurements much enhanced. The results may be stated as follows after all corrections have been applied:—

Mean of older determinations,

$$1 \text{ metre} = 1\,553\,164.03\lambda_R \text{ or } \lambda_R = 0\mu.643\,847\,00$$

New determinations,

$$1 \text{ metre} = 1\,553\,164.13\lambda_R \text{ or } \lambda_R = 0\mu.643\,846\,96$$

the measurements being made in dry air at 15° C. and under 760 mm. pressure.

Among many other matters of interest in the "Procès-verbaux" is an appreciation of the spectroscopist Thalen, formerly the representative of Sweden on the International Committee, written by his successor, M. Hasselberg. After the application of certain corrections, the author shows that the agreement of Thalen's measurements of the wave-lengths of the three principal cadmium rays with those of Michelson is extraordinarily close. Rowland's values are higher in each case by about one part in fifty thousand.

An appendix deals with the behaviour of nickel steel standards of length. According to the latest investigations, a metre bar of the alloy invar, annealed in the usual way at 40° C. for many hours, grows after this treatment, at first somewhat rapidly for work of the highest precision—a micron in 100 days—and afterwards at a diminishing rate. A curve is given showing that a bar which has been under observation for 4000 days has not yet quite ceased to change. During the whole period, however, its change is less than fifteen microns. There is no need to emphasise the enormous utility of invar for many purposes, though this phenomenon would appear to render it less suitable for absolute standards than was once supposed.

Passing now to the volume of the "Travaux et Mémoires," we find the papers included in it are six in number. Three of these relate to work done some time ago by Dr. Chappuis before his departure from Sèvres, the first being an account of further studies on the gas thermometer. This is followed by full descriptions of his now classic researches on the dilatation of water and of mercury. The first paper, of sixty-six pages, deals with a repetition of the well-known experiments which led to the adoption of the hydrogen scale as the recognised international standard of temperature over ordinary ranges. Using both the original large reservoir of platinum-iridium and one of hard glass, values were obtained for the coefficient of expansion of hydrogen under one metre

initial pressure and at constant volume, substantially identical with those found earlier. No perceptible difference of "march" was found between the constant-volume and constant-pressure hydrogen scales between 0° and 100°. Many data are also given for nitrogen and carbonic acid.

An elaborate paper by M. Daniel Berthelot discusses the theory of the gas thermometer and the thermodynamic scale. It is proposed to deal with this paper in a later article on thermometry.

Other papers full of great practical interest deal with the general methods of standardisation of divided scales and of boxes of weights. These give, in a summarised form, all the results of the unrivalled experience of Messrs. Benoit and Guillaume and the Sèvres laboratory on these points. The remarks of Dr. Benoit in the early pages of his paper on the standardisation of weights should be studied by every constructor of weights of precision.

NOTES.

SIR JAMES DEWAR, F.R.S., has been elected an honorary member of the German Chemical Society.

DR. F. W. PAVY, F.R.S., consulting physician to Guy's Hospital, has been awarded the Godard prize of 1000 francs by the Paris Academy of Medicine, for his works on carbohydrates and diabetes.

THE death is announced, at fifty-one years of age, of Dr. Giuseppe Ciscato, professor of theoretical geodesy in the University of Padua.

A SPECIAL general meeting of the Geological Society will be held on Wednesday, February 10, 1909, in order to consider the result of the vote of the fellows on the question of the admission of women into the society.

WE learn from *Science* that Prof. E. B. Poulton, F.R.S., will give the annual address before the Entomological Society of America at its Baltimore meeting on December 31. The title of the address will be "Mimicry in the Butterflies of North America."

DR. H. BRERETON BAKER, F.R.S., Lee's reader in chemistry in the University of Oxford, will deliver the Wilde lecture of the Manchester Literary and Philosophical Society on March 9, the subject being "The Influence of Moisture on the Combination of Gases."

THE Broca prize of 1500 francs for 1908 has been awarded by the Anthropological Society of Paris to Dr. Paul Rivet. The prize was founded in 1881 by Madame Paul Broca, and is awarded for the best memoir on human anatomy, comparative anatomy, or physiology in relation to anthropology. The next award will be made in 1910.

A MOVEMENT, supported by the Linnean Society of New South Wales, is on foot to approach the Australian Government with the object of having Barrow Island, sixty miles off the north-west coast, set apart as a fauna reserve. The island, which is remarkable for its kangaroo, bandicoot, rat, and wren, none of which occurs on the mainland, is likely to be leased for sheep-farming, to the detriment of the fauna. The wise policy of the Crown's retention of islands as sanctuaries for wild life is being amply justified by the experiences of New Zealand and the United States, and the Barrow Island fauna is worth effort to save.

THE Academy of Natural Sciences of Philadelphia has appointed Dr. A. E. Brown as its delegate to the University of Cambridge Darwin memorial celebration.

According to *Science*, although Darwin became a member of the Dresden Academy in 1857, before the publication of the "Origin of Species," it is probable that to the Philadelphia Academy belongs the honour of having been the first foreign society to accord his great work official recognition. He was elected a correspondent on March 27, 1860. To his election Darwin refers appreciatively in a letter to Lyell dated May 8 of that year.

MR. ROOSEVELT will be accompanied on his African expedition by Messrs. Edgar A. Mearns, Edmund Heller, and J. Alden Loring. Mr. Mearns is an army surgeon, who has written an account of the "Mammals of the Mexican Boundary of the United States," as well as numerous papers on zoology and botany. He is the founder of the American Ornithologists' Union. Mr. Heller is a zoologist, formerly on the staff of the Field Columbian Museum at Chicago. He has had some experience of African travel, having been a member of Mr. Carl E. Akeley's exploring party in 1905. Mr. Loring is an authority on the smaller mammals, and is well known in America as a collector.

THE Carnegie Institution has made arrangements for what should prove to be important work in the development of magnetic science. According to a Central News message from New York, a vessel is being built under the auspices of the institution every portion of which is to be absolutely non-magnetic, even the anchors being made of bronze. The ship is to be used for the purpose of studying magnetic conditions in all parts of the world. With funds provided from the same source, Dr. Thomson and Prof. Beattie are, a special correspondent of the *Times* reports, engaging in a Cape-to-Cairo trek with the view of extending the magnetic survey through Africa, on which they have been at work for some ten years, sometimes at their own expense and sometimes assisted by colonial Governments.

EVIDENCES of the growing interest in *aéronautics* among men of science and others of all nationalities continue to be forthcoming. The *Aéronautical Society* of Great Britain has just acquired an experimental ground near Dagenham Station, which is about half a mile long and the same distance in width. It includes certain mounds about 50 feet high, which will be useful for testing models. It is expected that the ground will be opened at an early date, and that it will be provided, as soon as funds are available, with a completely equipped scientific establishment. The Paris correspondent of the *Globe* reports that a proposal is to be made in the Chamber of Deputies asking the French Government to arrange an international *aéronautical* exhibition for 1910, and the United States Secretary of War in his annual report just presented to Congress asks for 100,000*l.* for army *aéronautics*. It will be remembered that last session a grant of 40,000*l.* was sought unsuccessfully by the Congress War Department.

THE committee of the Research Defence Society has circulated a report dealing with the work accomplished by the society since January last, the month in which it was founded. There are now 1650 members, of whom 160 are ladies. Rules for the society have been approved by the committee, and will be submitted in due course to a general meeting. Branches have been formed, or are being formed, at Birmingham, Bournemouth, Cambridge University, Clifton, Dublin, Edinburgh, Leeds, Liverpool, Manchester, Oxford, and Torquay. Eleven pamphlets of an explanatory kind have already been issued by the committee, and about 500 bound sets of these have been sent to public free libraries and to the libraries of certain

scientific and educational institutions. Representatives of the society have spoken at several debates, in London and in the provinces, on the subject of experiments on animals. The report points out that the society will be glad to assist any person who wishes to lecture on the results that have been obtained by the help of research in the prevention and treatment of disease.

THE construction of a new tunnel under the Thames at Rotherhithe, for wheeled traffic and foot passengers, was described in a paper read by Mr. E. H. Tabor before the Institution of Civil Engineers on December 8. The tunnel is 30 feet in diameter, 3 feet more than the Blackwall Tunnel, which it resembles in many ways. It is longer, however, owing to the docks on each side of the river making an oblique crossing necessary. The approaches include about 1000 feet of tunnel, curved to a radius of 800 feet, and special machinery was necessary for facing the cast-iron segments used in the lining of this part. In order to find the nature of the strata as the work progressed, a pilot tunnel was driven in advance of the main one by aid of a shield fitted with a rotary excavator. The work has been carried to a successful issue in four years, or in eighteen months less than was allowed for it, and the actual cost of about one million pounds is somewhat less than the original estimate.

THE *Times* correspondent at Stockholm states that the Nobel prizes awarded for the year by the Swedish academies were distributed on December 10 with the usual ceremonies and commemorative speeches. The award to Prof. Rutherford (chemistry) was made on account of his researches in radio-activity; to Prof. Lippmann (physics), for discoveries in connection with colour-photography; to Prof. Metchnikoff and Paul Ehrlich (medicine), for their researches in the subject of natural and acquired immunity; and to Prof. Rudolph Eucken (literature), for his philosophical works. All the prize-winners, except Prof. Metchnikoff, who was prevented from attending, were present to receive their prizes, consisting of a medal, diploma, and a cheque for 7680*l.*, at the hands of the King. Prof. Metchnikoff's prize was handed, on his behalf, to the Russian Minister, Baron Budberg.

As already announced, the Australasian Association for the Advancement of Science will meet in Brisbane on January 11 next. The association will come of age next year, and the meeting will inaugurate the jubilee year of Queensland, the history of which as a separate State dates from 1859. The new president of the association is Prof. W. H. Bragg, of Adelaide, while the sectional presidents are Prof. Pollock, of Sydney (astronomy, mathematics, and physics); Prof. Easterfield, of Wellington, N.Z. (chemistry); Prof. Skeats, of Melbourne (geology and mineralogy); Mr. Charles Hedley, of Sydney (biology); Mr. A. H. S. Lucas, of Sydney (geography); Mr. A. G. Hamilton, of Wellington, N.Z. (ethnology and anthropology); Mr. G. H. Knibbs, of Melbourne (social and statistical science); Mr. H. W. Potts, of the Hawkesbury College (agriculture); Prof. R. W. Chapman, of Adelaide (engineering and architecture); Dr. J. Mason, of Wellington, N.Z. (sanitary science and hygiene); Mr. Peter Board, of Sydney (mental science and education). The acting permanent secretary, Mr. J. H. Maiden, can be addressed at the office of the association, Royal Society's House, Sydney, and will be glad to give further particulars and to enrol members for New South Wales.

THE new radio-telegraph station, which has been erected for the Post Office at Bolt Head, South Devon, as stated in *NATURE* of December 10 (p. 166), was opened by Mr.

Sydney Buxton, the Postmaster-General, on December 11. The station will be available for communication with all ships fitted with wireless telegraphy, whatever their nationality and whatever the particular system of radio-telegraphy with which they may be equipped. It will be worked in accordance with the provisions of the International Radio-telegraphic Convention, which was ratified by his Majesty's Government in June last, and came into operation on July 1. The great majority of the liners which call at ports in the English Channel can be communicated with through the station. It will also be available for transmitting, to and from ships, messages originating at or destined for places abroad. The range of the station is 250 miles, but for the most part the station will probably not have occasion to exchange messages with ships beyond 100 miles. The station will also be used for communication with the Channel Islands if there is any interruption in the telegraph cable between England and the islands. In the course of an address at the opening of the station, Mr. Buxton pointed out that the primary use of wireless telegraphy is for communication from ship to shore and from shore to ship. He added that the cost of wireless stations for shore-to-shore communication is far less than that of a cable, and, further, that in mountainous or inaccessible districts, where the erection or maintenance of land lines is impracticable or exceedingly costly, connection by wireless telegraphy may be the most effective means of communication.

DR. CHARLES EDWARD BEEVOR, whose death on December 5, at the early age of fifty-four, we announced with sincere regret last week, was for five-and-twenty years an ardent worker in the rapidly extending field of neurology. His interest was early centred on the action of muscles, and his Croonian lectures, delivered in 1907, contained the fruits of patient observations extending over many years. Recently, he published in the *Philosophical Transactions of the Royal Society* an extensive monograph on the distribution of the arteries of the brain, illustrated with colour-photographs from his beautiful preparations. This research was the result of enormous industry, for in many instances five cerebral arteries were injected simultaneously with coloured fluids. His Lettsomian lectures, dealing with the diagnosis and localisation of intra-cranial tumours, were the fruit of much careful observation. Owing to his extreme modesty and the unpretentious way in which he worked, the value of his observations was, until recently, known mainly to members of the neurological section of the Royal Society of Medicine, of which he was president at the time of his death; but, within the last few years, neurologists all over the world have recognised the merits of his work, and this summer, by special request, he delivered an address to the American Medical Association. Generous and unassuming to a remarkable degree, he thought little of his own researches compared with those of his colleagues. During the preparation of the Croonian lectures it was difficult to make him understand that what he called "simple facts" were unknown outside the circle of his neurological friends. He belonged to that rare group of men who inspire, not only respect, but affection in all who are brought into contact with them.

DR. OTIS TUFTS MASON, head curator of the division of ethnology of the United States National Museum at Washington, passed away on November 5 at the age of seventy years. Dr. Mason was the great exponent of the technology of the American Indians; the general trend of his studies was embodied in two valuable little books, "The

Origins of Invention" (London: Walter Scott, 1895), and "Woman's Share in Primitive Culture" (Macmillan, 1895). Most of his memoirs were published in the Annual Reports of the United States National Museum. The following imperfect list will give some idea of his activity and wide range of interests:—"The Human Beast of Burden" (1887), "Cradles of the American Aborigines" (1887), "The Ulu or Woman's Knife of the Eskimo" (1890), "Influence of Environment upon Human Industries or Arts" (1896), "Pointed Bark Canoes of the Kutenai and Ainu" (1899), "Traps of the American Indians" (1901), "A Primitive Frame for Weaving Narrow Fabrics" (1901), "Aboriginal American Harpoons" (1902). Dr. Mason was a great authority on American basketry, and published several papers on the subject; and in 1904 appeared his memorable work, "Aboriginal American Basketry: Studies in a Textile Art without Machinery," which consists of 377 pages, 212 figures in the text, and 248 plates, which will long remain the standard work on the subject. Dr. Mason arranged some very instructive cases in the museum illustrating the evolution and distribution of various implements, and no one who has had the privilege of being taken round the U.S. National Museum, and especially the grand collection of baskets, by Otis T. Mason will ever forget the erudition and enthusiasm of that lovable man.

THE annual general meeting of the Royal Agricultural Society was held on December 9. The report of the council announces that in recognition of the valuable services rendered by him to the agriculture of Canada, the council has elected, as an honorary member of the society, Dr. William Saunders, C.M.G., Director of Experimental Farms, Department of Agriculture, Ottawa. The Earl of Jersey has been nominated for election as president of the society for the year 1909. The seventieth annual show of the society will be held at Gloucester on June 22-26 of next year, and the show in 1910 will be held at Liverpool. At the Woburn Experimental Station field trials have been begun with the growing of different varieties of lucerne, and on the use of calcium cyanamide on corn and root crops; also, the influence of inoculating methods for lucerne and white clover has been tried. Further work has been done at the pot-culture station on the action of magnesia in soils, and, for the Royal Commission on Sewage Disposal, an additional year's work on the utilisation of sewage sludges has been conducted. In the botanical department of the society a bacterial disease of swede turnip was investigated, which had rendered an entire crop a failure. Black-scab disease of potato, more correctly known as potato canker, made its appearance again in many places. This pest, by its steady increase, threatens to be as serious for potato growers as the potato disease. Various injuries affecting roses, potatoes, beans, peas, turnips, and swedes were reported upon. The zoological department reports that, on the whole, crops appear to have been freer than usual from insect attack during the past year. Much attention has been given to a disease of the pea plant, which, although apparently widespread has hitherto escaped observation in this country. It is due to the so-called corn thrips, *Thrips cerealium*. The general interest in the external parasites of domestic animals, which has been excited by the discovery of their power to communicate disease, is still on the increase, and numerous ticks and other animals are continually sent to the society for identification from various parts of the world.

A LECTURE on the Danish North-east Greenland Expedition was delivered at a meeting of the Royal Geographical

Society on December 7 by Lieut. A. Trollé, R.D.N. The principal object of the expedition, which was planned by the late L. Mylius Erichsen, was to explore the north-east coast of Greenland from 77° N. lat. to the cairns erected by Peary in 82° N. lat., and the east side of Peary Land in about 83° N. lat. The vessel *Danemark*, a steam barque of 242 tons register, carried a fully equipped expedition, with supplies for three years, and reached Kolde-way Island (76° 20' N. lat., 18° 30' W. long.) on August 13, 1906, after thirteen days' navigation through 125 miles of drift ice. Winter quarters were ultimately established near Cape Bismarck (76° 46' N. lat., 18° 37' W. long.), where meteorological, magnetic, and tidal observations were established, and a number of expeditions went northwards for the purposes of mapping and placing depôts containing stores for subsequent journeys. Towards the end of March, 1907, expeditions set out northwards in four divisions. The fourth and third divisions returned in May with valuable cartographical material; the second returned on June 23, after a remarkable journey of some 1250 miles, having reached Cape Bridgman (83° 30' N. lat.). The first division, under Erichsen, did not return, and it was only after several fruitless attempts at rescue that a sledge party sent out in the following March definitely ascertained that all the members of this division had perished. The precise value of the scientific results of the expedition is not yet known, but it is certainly exceptionally high. Large collections of ethnographical, geological, zoological, and botanical specimens have been secured, a large area of newly discovered land has been accurately mapped, and a valuable series of meteorological observations, including kite observations of the upper atmosphere, has been recorded.

"THERE is no doubt that the hopes expressed by Prof. Koch and others that atoxyl would prove a general and permanent cure for cases of sleeping sickness must now be abandoned. . . . We have at present no other treatment, apart from atoxyl and its allies, which has shown any signs of successful results whatever." These two not very hopeful statements are the opening and closing sentences in the introduction written by Dr. A. D. P. Hodges to the Quarterly Report on the Progress of Segregation Camps and Medical Treatment of Sleeping Sickness in Uganda, by Captain A. C. H. Gray, published by the Sleeping Sickness Bureau. Captain Gray's report contains a full account of the results obtained by various methods of treatment in the three sleeping-sickness camps in Uganda, and if the outcome is not so encouraging as might be wished, the publication of so much experiment and experience in the treatment of sleeping sickness will be of great value to those engaged in the difficult quest of a remedy for this terrible scourge.

WE have to acknowledge the receipt of vol. ii., No. 70, of the *Anatomical Record*, a serial published at Philadelphia, and largely devoted to reviews of anatomical literature.

THE latest issues of the Proceedings of the U.S. National Museum include the following, viz.:—a revision of certain species of Noctuidæ hitherto included in Homoptera, by Mr. J. B. Smith (No. 1645); new American Palæozoic Ostracoda, by Messrs. Ulrich and Bassler (No. 1646); and descriptions of fossil crabs from California, by Miss Rathbun (No. 1647).

WE are indebted to Mr. A. J. Jukes-Browne for a copy of a paper on the bivalve molluscs of the "Venus" group from the older Tertiary formations of England and France, this paper being extracted from the October issue of the

Proceedings of the Malacological Society. In addition to re-defining the genera, the author makes numerous emendations on the nomenclature commonly in use among palæontologists in this country.

THE Horniman Museum and Library at Forest Hill, according to the sixth annual report, continues to make steady progress, both as regards the increase of the collections and in the matter of attracting visitors. The increase during the past year is specially notable in the ethnological department, the additions including implements and other specimens from the French caves, presented by the Christy trustees, and palæolithic implements from Swanscombe, Kent, the gift of Mr. J. Cross.

SPECIAL attention may be directed to a paper by Mr. R. I. Moodie in the October issue (vol. xix., No. 2) of the *Journal of Morphology* on the lateral-line system in extinct amphibians. Out of the five groups into which the stegocephalian amphibians are divided, a lateral-line system is found in all except the Aistopoda. As a rule, the system presents itself in the form of the channels of grooves constituting the "lyra" on the skulls of the typical labyrinthodonts; the smoothness of the bottom of these canals, which is most developed in the Stereospondyli, being apparently a feature distinctive either of age in the individual or of specialisation in the group. While these canals differ to some extent from the slime-canals of certain fishes, such as *Amia*, yet some degree of homology between the two types of structure can be traced. For these canals on the stegocephalian skull, the author proposes definite names. In the branchiosaurian group the head-canals are lacking, and their place is taken by a true "lateral line" on each side of the tail, similar to that of the modern salamander *Necturus*. An important corollary to, or rather result of, the investigation is the determination that the bone originally termed the squamosal in the stegocephalian skull is really that element, and not, as it has been attempted to prove, the supratemporal. The paper closes with the determination of the homology of other elements in the stegocephalian skull with the cranial bones of fishes.

WE have received from the author, Dr. W. L. H. Duckworth, an admirable descriptive catalogue of the specimens illustrating the comparative osteology of man and the higher apes contained in the museum of human anatomy at Cambridge. Although intended primarily for university students, this fully illustrated pamphlet of forty pages is well worthy of the best attention of naturalists, since it contains several items of information which it would be difficult, if not impossible, to find elsewhere. As an example we may cite the author's account of the distinctive characteristics of the heads of the gorilla and chimpanzee, which runs as follows:—"In the head of the gorilla the chief points of interest to be noted are the prominent brow-ridges, the flatness of the nose, the remarkable elevations on each side of the nasal aperture, the short but prominent upper lip, and the small ears with inconspicuous lobules. The nuchal region is not depressed as in man, for in the gorilla the great development of the muscles of the back of the head fills up the space between the head and the shoulders. . . . The head of the chimpanzee is smaller and rounder, and though the brow-ridges are very prominent and the upper part of the nose is depressed, yet the physiognomy is very different, owing mainly to the smaller size of the nasal alæ, and the long protruding upper lip. The ears, too, are different, being very large. There is also a slight but distinct nuchal depression."

THE habits of crinoids form the subject of a suggestive paper by Mr. A. H. Clark in the November number of the *American Naturalist*. From the very nature of the case, very little can be actually known with regard to these deep-sea organisms in the living condition, so that we must depend largely upon inference in trying to ascertain their nature. Their food consists, however, of minute pelagic organisms and small crustaceans, and it is obvious that, as a rule, the largest supply of this nutriment will be obtained by those individuals which live in deep water, as not only will they obtain what they can collect by themselves, but they will also receive a rain of carcasses from the upper layers. As a corollary of this, it appears that the size of these organisms depends upon the amount of their food-supply, so that the largest individuals ought to occur in the deepest water. On the other hand, where streams of ice-cold water, as on the west coast of Greenland, or still larger quantities of fresh water at a higher temperature, as on some of the coasts of Cuba, Guadeloupe, and Japan, flow into the ocean, they prove fatal to minute organisms, and in such situations the greatly increased food-supply renders it possible for crinoids to flourish and attain a large size in comparatively shallow water. Indeed, in some instances the individuals of various species attain their maximum size in situations of this nature. Crinoids present all colours except blue, and it appears that the smaller stalked forms are invariably yellow, which, as among parrots, may be the equivalent of no colour at all.

A REVISED second edition of the guide to Sowerby's models of British fungi on exhibition in the Natural History Museum at South Kensington has recently been issued. The publication, obtainable at a popular price, provides a fairly ready means of identifying the common larger Basidiomycetes and Ascomycetes. The descriptions in the new edition are still confined to the models, but omitted genera are mentioned. The most observable change is the division of species, formerly grouped under *Peziza*, under the genera *Otidia*, *Sarcoscypha*, *Macropodia*, *Plectonia*, and *Peziza*. A serviceable addition has been furnished in the glossary.

A DESCRIPTION, with maps, of the vertical distribution of plants in the Balkan States is contributed by Prof. L. Adamović to *Petermann's Mittheilungen* (vol. liv., part ix.). The horizons are broadly demarcated as lowland, upland, montane, alpine, and subnival. The wheat fields rise to an altitude of nearly 4000 feet, and about the same elevation one reaches the limit of fruit trees, also of such trees as the walnut, *Corylus coturna*, and the chestnut. The hornbeam, poplar, and birch continue to the middle of the montane region, where they give place to beech, fir, and Scots pine. At the lower limit of the subalpine region, about 6000 feet, woods are no longer formed, and above this altitude the juniper and mountain pine are reduced to bushes.

OF various plant diseases discussed by Mr. E. S. Salmon in his report on economic mycology for the year 1907-8, issued from Wye Agricultural College, the American gooseberry mildew, *Sphaerotheca mors-uvæ*, and "warty" disease or "black scab" of potatoes, caused by *Chrysophlyctis endobiotica*, must be classed as extremely noxious pests, and the apple scab, due to the fungus known as *Fusicladium dendriticum* or *Venturia pomi*, should be recognisable by all fruit-growers. With regard to the first-named, Mr. Salmon continues to urge the necessity for more drastic measures, and very rightly foresees in the potato scab another insidious pest that calls for

systematic and compulsory eradication. Apple scab is fortunately less dangerous, being amenable to treatment, but growers will be well advised to digest the advice given regarding Bordeaux mixture for controlling this and other fungal pests.

DR. H. MOLISCH describes in the *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften* (Vienna, vol. cxvii., part i.) some experiments upon forcing the resting shoots of woody plants by soaking them in warm water. Twigs of the hazel, bearing male catkins, placed for twelve hours in a bath registering about 30° C. in mid-November, and then removed to a warm house, were hastened into flower in eight days. Flowers of Forsythia similarly treated developed in a fortnight. Lilac, dog-wood, horse-chestnut, and other shrubs or trees were also responsive to treatment. The stimulus is only effectual at a certain period, and appears to be distinctly localised. Staminate buds of hazel could be forced in November, but twigs bearing pistillate flowers could not be stimulated until December. As showing the localised nature of the effect, a photograph of a hazel shoot is given where the branches on one side that had been steeped are fully grown, while the branches on the other side remain quite dormant.

IT is well known that the central regions of Australia are too dry for successful cultivation without irrigation. There exists a vast artesian basin, but unfortunately the water obtained from the bores contains sodium carbonate, and is thereby rendered so alkaline that it cannot be used for irrigation purposes. A suggestion has been put forward that nitric acid should be mixed with the irrigation water in sufficient quantity to convert the carbonate into nitrate, *i.e.* to change the injurious constituent into a valuable fertiliser. The practical difficulties to be overcome are very considerable, but a successful result would be of incalculable benefit, and the scheme is being investigated in the chemical laboratory of the Sydney Department of Agriculture.

IN the *Memoirs of the Indian Meteorological Department* (vol. xx., part iv.) Mr. R. L. Jones discusses types of weather in the south of the Madras Presidency. The most important types, corresponding to the four seasons, are:—(1) cold-weather type, late December to February; (2) hot-weather type, March to May; (3) south-west monsoon type, June to early October; (4) north-east monsoon type, October to December. Charts showing the 8h. a.m. pressure distribution for each of these have been selected from the published daily weather reports, and explanatory notes are added to each. Abnormal conditions sometimes occur; the change, however, from one type to another takes place gradually as the year advances. In order to appreciate these, Mr. Jones deals with the normal and the most abnormal weather types for each month. The subject is important, and very interesting; it has been a favourite inquiry in various countries, *e.g.* Abercromby's "Principles of Forecasting," published by the Meteorological Council in 1885, deals with the question in considerable detail, so far as relates to the weather of the British Islands.

WHEN we use force to move a body or impede movement we are conscious of our effort exerted. Reasoning from this human experience, Sir John Herschel suggested in his "Outlines of Astronomy" that the movements of falling bodies, or of any matter in space, are "the direct or indirect result of a consciousness and a will existing somewhere, though beyond our power to trace, which force we term gravity." Prof. Karl Pearson refers to this animistic view in his "Grammar of Science," and Dr.

O. Z. Bianco, of the Royal University of Turin, now sends us a quotation from Schopenhauer's dissertation "Ueber den Willen in der Natur" to show that the German metaphysician accepted Herschel's speculation as to the cause of motion of inorganic matter under the influence of gravitation. Dr. Bianco deals with the same subject in a paper entitled "Schopenhauer e la gravitazione universale," published in the *Rivista Filosofica* in 1906.

THE *Physical Review* for October contains a paper by Prof. E. F. Nichols and Dr. W. S. Day on new groups of residual rays in the long wave spectrum. The substances tested were rock salt, ammonium chloride, witherite (barium carbonate), and strontianite (strontium carbonate). The radiation from a group of Nernst burners was reflected in succession from five plane surfaces of one of these materials, and, after passing through a spectrometer composed of concave silvered mirrors and a wire diffraction grating, fell on a Nicholls radiometer, the deflection of which could be observed. The residual wave-lengths found are:—for rock salt, 52.3; for ammonium chloride, 51.4; for witherite, 46.0; and for strontianite, 43.2×10^{-5} centimetre.

A LARGE part of the November number of the *Physikalische Zeitschrift* is devoted to the papers read at the *Versammlung deutscher Naturforscher und Aerzte* at Cologne in September. Amongst a number of interesting communications, we note one from Dr. J. Classen, of Hamburg, on the value of the quotient electric charge by mass for the cathode rays. His method is that of Kaufmann, in which the velocity of the electron is taken to be that due to its passage through the electric field between cathode and anode, and the effect of a magnetic field on the path of the electron is measured. In Dr. Classen's experiments a Wehnelt cathode is situated a millimetre in front of a large anode with a hole a millimetre diameter at its centre, and the discharge tube is placed in a magnetic field due to two large coils arranged in the Helmholtz manner. The deflections of the rays are determined photographically. The value of the quotient obtained is 1.77×10^7 , i.e. considerably less than the 1.86×10^7 obtained by Kaufmann.

We have received a copy of the "Guide-annuaire de Madagascar et Dépendances" for the year 1908. This official publication contains a complete list of Government officials in the various provinces of Madagascar, and much valuable statistical information.

We have received from Messrs. John Wheldon and Co., of Great Queen Street, London, a copy of a catalogue of 800 books and papers on cryptogamic botany which they offer for sale. The books are catalogued alphabetically by authors' names under the headings *algæ*, *fungi*, *lichens*, *musci* and *hepaticæ*, *filices*, and general.

MESSRS. SPOTTISWOODE AND CO. have sent us a copy of the autobiography of the late Sir Edward Frankland, which was edited and concluded by his two daughters, and printed for private circulation in 1902, under the title "Sketches from the Life of Edward Frankland." Copies of this interesting volume may now be obtained from Messrs. Spottiswoode at the price of 3s. 6d. net.

THE first two numbers have reached us of *Pathologica*, a new bi-monthly journal devoted to pathology, and having a strong editorial committee. The journal includes original articles, abstracts of recent publications, and reviews of books; it is published by Luigi Griffini, Genoa.

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OUR ASTRONOMICAL COLUMN.

WATER VAPOUR IN THE ATMOSPHERE OF MARS.—A telegram from Prof. Lowell, published as Circular No. 106 of the Kiel Centralstelle, reads as follows:—"Quantitative measures by Very, with his new spectral comparator, of Slipher's spectrograms Mars mmron (?), show little a water vapor band twenty-two per cent. stronger in Mars spectrum than in our own air. Solar lines C equal.—Lowell."

Our readers will remember that early in the present year Mr. Slipher photographed the spectrum of Mars in which the a water-vapour band was considerably stronger, relatively, than in a similar spectrum of the moon, both spectra being taken when the objects were at about the same altitude (see *NATURE*, vol. lxxvii., No. 2002, March 12, p. 442). It is to these photographs, presumably, that the above message refers, the queried word probably meaning "moon."

ACCELERATION OF MATTER IN THE TAIL OF MOREHOUSE'S COMET.—In a paper published in No. 22 of the *Comptes rendus* (November 30, p. 1033), MM. Baldet and Quéniisset give further details concerning the accelerating velocities of the agglomerations seen, on their photographs, in the tail of comet 1908c.

Between September 17 and November 6 ninety-six photographs were obtained, with six different cameras, at the Juvisy Observatory, and, on examining these, it is quite possible to recognise the same features of the tail on photographs taken at different times on the same night and also on those taken on successive nights.

The photographs taken on October 15 and 16, with an interval of nineteen hours, afford a good example. Measures made on that of October 15 showed that a luminous mass, then some 580,000 km. from the head, was travelling at a velocity of about 14 km. per sec. The same mass was easily recognisable on the photograph of October 16, and the measures showed that it was then about 2,200,000 km. from the head, that is to say, it had travelled 1,600,000 km. during the interval; had 14 km. been maintained as a uniform velocity, the distance covered would have been only 960,000 km. Measures made on two plates taken on October 15, with an interval between the exposures of 1h. 40m., showed that another similar luminous mass was travelling at the velocity of 58 km. per sec.

Other peculiarities in the tail are also noted, and in one of the two photographs which accompany the paper there is a remarkable deflection in the tail, not far from the head, which seems to indicate that the ejected matter had encountered some such obstructing medium as would be provided by meteoritic debris.

The peculiar changes of the comet's appearance are also reviewed by Prof. Barnard in No. 4, vol. xxviii., of the *Astrophysical Journal* (p. 292, November). With three cameras, Prof. Barnard secured 190 negatives, which show very strikingly how rapidly the enormous changes in the comet's appearance took place. Two photographs reproduced with the paper were taken on September 30 and October 1 respectively, the interval between the exposures being barely twenty-four hours; yet the general appearance of the tail was utterly transformed during that interval.

CHARACTERISTICS OF THE SUPERIOR (K_3) LAYER OF THE SUN'S ATMOSPHERE.—In a paper published in No. 22 of the *Comptes rendus* (November 30, p. 1016), M. Deslandres states that by employing a large spectroheliograph of a special type he has succeeded in obtaining photographs with the pure radiation (K_3) of the highest layer of the sun's atmosphere. In previous work the calcium radiation, K_3 —the central dark reversal of the calcium K line—has always been mixed with varying proportions of the bright (K_2) reversals which bound it on either side, consequently the photographs have shown the integrated phenomena of the highest layer and the layer immediately below it; but in the new photographs those phenomena peculiar to the upper layer are shown alone. The favourable weather of the last four months has permitted a fine set of such photographs, extending over four rotations of the sun, to be obtained.